An Electrochemical Immunosensor Based on AuNPs/ZIF-8/helical Carbon Nanotubes Nanocomposites for the Detection of Cardiac Troponin I

Junling Jin^{1,2,3}, Yamei Shu¹, Xiang Ding^{1,2,3*}, Xiaobing Huang^{1,2,3}, Lihui Ou^{1,2,3}, Yuandao Chen^{1,2,3}, Anguo Xiao^{1,2,3}

¹ Hunan Province Cooperative Innovation Center for The Construction & Development of Dongting Lake Ecological Economic Zone, College of Chemistry and Material Engineering, Hunan University of Arts and Science, Changde, 415000, China

² Hunan Provincial Key Laboratory of Water Treatment Functional Materials

³ Hunan Province Engineering Research Center of Electroplating Wastewater Reuse Technology

*E-mail: dingxiang83@163.com

doi: 10.20964/2020.08.78

Received: 6 December 2019 / Accepted: 21 April 2020 / Published: 10 July 2020

ZIF-8, one of the metal organic frameworks, has hierarchical structure and high surface area, which can be used as a carrier material for the fabrication of biosensors. However, the poor electrical conductivity hinders its applications in electrochemical biosensors. Here, using the nanocomposites of Au nanoparticles, metal organic frameworks and helical carbon nanotubes, we developed the immunosensor for the detection of cardiac troponin I. The thin films made of Au nanoparticles, ZIF-8 and helical carbon nanotubes were bio-interfaced with antibody for the use of immuno-electrode. The conductivity of electrode surface improved greatly by adding helical carbon nanotubes into ZIF-8. Signal measurement were performed by differential pulse voltammetry (DPV) technique. The proposed immunosensor was used to detect cardiac troponin I in the linear range of 0.1-40 ng/mL with a detection limit of 0.04 ng/mL.

Keywords Metal organic frameworks; ZIF-8; Au nanoparticles; Helical carbon nanotube; Cardiac troponin I

[FULL TEXT](#)

© 2020 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).